NON-PUBLIC?: N
ACCESSION #: 9205290026
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Nine Mile Point Unit 1 PAGE: 1 OF 6

DOCKET NUMBER: 05000220

TITLE: Reactor Scram on High Neutron Flux Caused by Failed MPR Servo Motor Position Indicator
EVENT DATE: 04/18/92 LER #: 92-008-00 REPORT DATE: 05/18/92

OTHER FACILITIES INVOLVED: N/A DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 098

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: R. L. Tessier, Manager Operations TELEPHONE: (315) 349-2707
NMP1

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: TG COMPONENT: ZT MANUFACTURER:
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 18, 1992 at approximately 1039 hours, with the mode switch in the "RUN" position and reactor power at approximately 98 percent, Nine Mile Point Unit 1 (NMP1) experienced a Reactor Protection System (RPS) actuation. Specifically, a full reactor scram caused by neutron flux exceeding the flow-biased Average Power Range Monitor (APRM) scram setpoint. Additionally, the High Pressure Coolant injection (HPCI) System initiated on low reactor water level, as expected.

The root cause of this event is failure of the MPR servo motor position indicator providing erroneous position indication of the MPR percent servo stroke.

Corrective actions were to stabilize and cool down the reactor in accordance with plant procedures; and to troubleshoot the MPR and correct

the deficiency with the MPR's servo motor position indicator.

END OF ABSTRACT

I. DESCRIPTION OF EVENT

On April 18, 1992 at approximately 1039 hours, with the mode switch in the "RUN" position and reactor power at approximately 98 percent, Nine Mile Point Unit 1 (NMP1) experienced a Reactor Protection System (RPS) actuation. Specifically, a full reactor scram caused by neutron flux exceeding the flow-biased Average Power Range Monitor (APRM) scram setpoint. Additionally, the High Pressure Coolant Injection (HPCI) System initiated on low reactor water level, as expected.

NMP1 utilizes the Mechanical Hydraulic Control (MHC) Turbine Control System. Prior to the scram, the Electronic Pressure Regulator (EPR) was controlling reactor pressure and the Mechanical Pressure Regulator (MPR) was being used as a backup. The MPR servo stroke was observed to be set at approximately 30 percent. The correct setting for this stroke is 70 to 80 percent to achieve about a 10 psi difference between the MPR and the EPR. The MPR servo stroke was re-adjusted to indicate the correct setting.

Approximately 3 minutes prior to the scram, the MPR took control of reactor pressure from the EPR. The control room operator observed that reactor pressure was stable and the EPR servo stroke was decreasing from 94 percent to 88 percent. At this time, an EPR failure seemed to be the problem, so the control room operator turned off the EPR and attempted to control reactor pressure manually with the MPR. Reactor pressure started dropping and the control room operator stopped reducing pressure with the MPR. Reactor pressure dropped to a low of 994 psig. Very shortly thereafter, reactor pressure rapidly started to increase, causing voids to collapse and neutron flux to increase to the flow-biased APRM scram setpoint. A peak reactor pressure of 1038 psig was reached.

Following the scram signal, all control rods inserted to position 00. The turbine tripped 5 seconds after the scram signal, and the generator tripped 5 seconds after the turbine trip, as expected. HPCI initiated on low reactor water level following the scram, as expected. HPCI brought reactor water level up to + 9 feet (scale, approximately + 108"). The lowest reactor water level reached was + 27 inches (scale).

Several problems were identified as a result of the scram:

1. HPCI brought reactor water level up to + 9 feet (approximately + 108"). The lower lip of the Emergency Condenser steam line is + 96 inches and the lower lip of the main steam line is + 140 inches.

2. Feedwater pump (FWP) 12 tripped on high water level (+95 inches) following the scram. The flow control valve (FCV) indicated shut and should have bypassed this automatic trip. The pump did start when the FWP high level trip bypass switch was taken to bypass, as expected.

I. DESCRIPTION OF EVENT (cont.)

3. The Turbine Building fire alarm annunciated.

4. Several computer points did not print out on the alarm typer following the scram.

5. FWP 11 automatically started in the HPCI mode following the low reactor water level but no significant increase in flow was indicated.

II. CAUSE OF EVENT

Troubleshooting was performed on the MPR. The root cause of this event is failure of the MPR servo motor position indicator providing erroneous position indication of the MPR percent servo stroke. This failure caused the control room operator on the shift prior to the scram to reposition the MPR to 70 to 80 percent of servo stroke. This repositioning allowed the MPR to take control of reactor pressure from the EPR. The failed servo motor position indicator made it difficult for the control room operator to control reactor pressure using the MPR.

A possible contributing cause was that dirt may have inhibited movement (in both directions) of the MPR balance beam, causing incorrect response of the MPR to changes in reactor pressure.

The cause of the high neutron flux scram (RPS actuation) was a rapid reactor pressure increase following a period (45 seconds) of low pressure (1030 psig to 944 psig) operation. This period of low pressure operation at full power created a large void inventory, which collapsed with the reactor pressure increase, adding positive reactivity and causing the neutron flux spike to reach the flow-biased APRM scram setpoint.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10CFR50.73 (a) (2) (iv), "any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)."

The flow biased APRM scram is an automatic Reactor Protection System action to prevent exceeding a fuel cladding safety limit. The integrity of the fuel clad as a barrier to the release of fission products is assured if a safety limit is not exceeded.

In this event, as the turbine flow control valves closed, reactor pressure increased and the flow-biased APRM scram setpoint was reached. A high reactor pressure scram was available as a back-up to the flow-biased APRM scram.

III. ANALYSIS OF EVENT (cont.)

The initiation of the flow-biased APRM scram and HPCI System are protective modes of operation, and they performed their intended functions. There were no adverse safety consequences as a result of this event, nor was the reactor in an unsafe condition during or after this event.

There were no adverse consequences to the health and safety of the general public or plant personnel as a result of this event.

IV. CORRECTIVE ACTIONS

Short term corrective actions are:

1. Stabilized and cooled down the reactor in accordance with plant procedures.

2. Initiated Work Request (WR) #202827 to troubleshoot the MPR and WR #203461 to correct the deficiency with the MPR's servo motor position indicator. The MPR servo motor position indicator was replaced and calibrated and the servo stroke time was adjusted in both directions. Linkages and mechanical stops were adjusted, and the lead/lag response curves were verified. Pressure regulation values were verified within specification.

3. Initiated WR #202869 to troubleshoot the EPR. The EPR servo stroke was tested and results were satisfactory.

4. Deviation/Event Report (DER) #1-92-Q-1713 was initiated to evaluate HPCI raising reactor water level above the lower lip of the Emergency Condenser steam line (+ 96 inches) and below the lower lip of the main steam line (+ 140 inches). The disposition states that water entering the Emergency Condenser steam line following a scram has been analyzed for thermal, seismic and deadweight pipe stress. The conclusion is that pipe stresses are within code allowable stresses and the pipe support loads have not been significantly increased. Water did not enter the main steam lines.

5. DER #1-92-Q-1695 was initiated to investigate the trip of FWP 12. The disposition states that the feedwater trip interlocks worked as designed and that the FCVs were not fully closed. The FCV was in the process of closing when the + 95 inch trip level was reached. Also identified was that bypass FCV was leaking past and this contributed to the reactor water level increasing after the scram. WR #202836 was initiated to adjust the limit switches on the bypass FCV. Work on the bypass FCV was completed and limit switches were adjusted such that leak through was reduced from 60 to 30 gpm. Repair of this valve to eliminate leakage is scheduled for the next refuel outage.

IV. CORRECTIVE ACTIONS (cont.)

6. The System Engineer performed an investigation to determine why the FWP 11 FCV did not open following the auto start of FWP 11. The investigation showed that the response time for the valve (approximately 8 seconds) did not allow opening during the 3 to 4 seconds that the valve had an open signal. A contributing factor is that the HPCI level setpoint for channel 11 (pump 11) is + 65 inches. This gives less of a proportional signal to open the valve than for channel 12 (pump 12) which has a level setpoint of + 72 inches.

Long term corrective actions are:

1. Simple Design Change SC1-0071-92 has been written for replacement of the servo motor position indicators with Linear Variable Differential Transformers (LVDTs).

2. The Turbine Building fire alarm annunciating is a designed alarm related to the 86G2 turbine generator trip relay. This alarm indicates that the water deluge fire protection system for the main

transformer is now permitted to operate. This nuisance alarm has been previously identified and modification request N1-88-137 has been previously initiated to correct the deficiency.

3. Several computer points not printing on the alarm typer following the scram is due to limitations of the process computer. This problem was previously identified, and will be addressed with the installation of a new scanner and process computer in 1994.

V. ADDITIONAL INFORMATION

A. Failed components: Selsyn Servo Motor Position Indicator.

B. Previous similar events:

LER 87-14 describes a scram from 88.5 percent power due to high neutron flux. A stuck servo valve in the Electronic Pressure Regulator hydraulic actuator caused Turbine Control Valve oscillations, and the resulting scram.

LER 85-05 describes a reactor scram from power due to high neutron flux. The electronic pressure regulator was in control at the time of the scram, however, maintenance on the mechanical pressure regulator found the stroke to be binding and sticky.

V. ADDITIONAL INFORMATION (cont.)

LER 84-18 describes a reactor scram during startup, at approximately 4 percent thermal power, due to low reactor water level. The mechanical pressure regulator sent erroneous open and then close signals to the turbine bypass valves, causing reactor water swell and shrink. The mechanical pressure regulator was cleaned, lubricated and returned to service, and performed satisfactorily.

The corrective actions from these previous similar events would not have prevented this LER from occurring.

C. Identification of components referred to in this LER:

Table omitted.

NIAGARA
MOHAWK

NIAGARA MOHAWK POWER CORPORATION
Nine Mile Point Nuclear Station Unit #1, P.O. Box 32, Lycoming,NY 13093

Kim A.Dahlberg
Plant Manager

(316) 349-2443
(315) 349-2640 (FAX)

May 18, 1992
NMP84892

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

RE: Docket No. 50-220
LER 92-08

Gentlemen:

In accordance with 10CFR50.73, we hereby submit the following Licensee Event Report:

LER 92-08 Which is being submitted in accordance with 10CFR50.73 (a)(2)(iv), "any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF) including the Reactor Protection System (RPS)."

This report was completed in the format designated in NUREG-1022, Supplement 2, dated September 1985.

A 10CFR50.72 report was made on April 18, 1992 at 1155 hours.

Very truly yours,

FOR K. A. DAHLBERG
PLANT MANAGER - NMP #1

Kim A. Dahlberg
Plant Manager - NMP1

KAD/JTP/lmc

ATTACHMENT

xc: Thomas T. Martin, Regional Administrator Region I
Wayne L. Schmidt, Senior Resident Inspector

*** END OF DOCUMENT ***